

## ZLE OPEN SCIENCE DECLARATION

The researchers and the staff working in the project ZLE developed an “Open Science Declaration” committing their research activities to the **standards of Open Science**. Research within the ZLE will be built upon the idea of sharing scientific methods, data and publications to **improve research quality** and make results accessible to the **scientific and non-scientific community**.

Members of the ZLE support the principles of Open Science as expressed by the Budapest Open Access Initiative [1], the Berlin Declaration [2], the Horizon 2020 Program [3] and the German Strategy for Open Access [4].

Funded by the Ministry of Science and Culture of Lower Saxony [5], one of the major goals of the ZLE is to make **energy research activities** and its resources **available for public use**, while preserving intellectual property of all involved parties. This will strengthen the research in Lower Saxony by promotion and expansion of cooperation between science and industry on strategic sectors [6]. Moreover, **greater transparency** in the use of public funds and in the development of research activities is enabled.

### OPEN METHODS

Exchange and sharing of methodologies will remove cognitive biases [7]. From the beginning of the project, open scientific exchange platforms are to be used for **research artifacts, data, results and documentation**. Respecting the autonomy of the researchers, ZLE encourages a **quick publication** of research and intermediate results. ZLE contributors can **freely decide** at which stage they want to publish their scientific activities. This will **support transparency, reproducibility and efficiency** of scientific research.

### OPEN SOURCE

With the goal of increasing transparency and to foster scientific exchange, collaborative participation and rapid deployment, the developed **research software** shall be made **available** for inspection, use and modification. Software for the project ZLE should be developed as an **Open-Source project**, where the whole **collaborative software development** is **publicly available**. The publication of software is to be done under appropriate **“permissive” licenses**, that allow use, replication, modification, and commercial exploitation of artifacts developed under the project.

Whenever possible, **open-source software** and **tools shall be used** to achieve the intended research results. Anonymized scripts from proprietary software are to be used if the project requires specific software solutions.

### OPEN DATA

The **data gathered** and **generated** within the research activities of the ZLE shall be made **publicly available** to a possible extent, and according to permissions. Their **reusability** and **applicability** follows the **FAIR principles** [8]. The use, construction and documentation of free, demonstrative data for experimentation, testing and demonstration is encouraged, as expressed by the H2020 Programme [3]. This will allow **reproductivity, verification, reuse, and transparency in results analysis**. The sharing and reuse of software solutions, knowledge and expertise improves the quality of services delivered and supports the advancement of research. Therefore, it is also encouraged by the European community [9].

## OPEN ACCESS

Following the Berlin Declaration [2], ZLE has the objective to enhance the digital exchange of scientific artifacts and digital assets. Dissemination of **methods and results** in digital exchange platforms shall allow public accessibility of the research results and transparency of scientific communication. Scientific publication should be submitted to classic high ranked journals where a professional peer-review process can be granted to support a professional publication culture.

**Every scientific publication**, such as journal papers or conference papers, authored by the researchers within the ZLE should be made **available** as **Open Access**, as intended by the Open Access Strategy for Germany [4]. This can be archived by using Open-Access options when submitting the paper (**Gold Open Access**) whenever possible or by publishing a post print version on publisher-independent repositories (**Green Open Access**). A listing of the publications shall be available.

## OPEN SCIENCE PLATFORM

Due to the interdisciplinary nature of ZLE, an infrastructure to share and exchange information and results is necessary. Within the ZLE, one of the **main goals** is the development of a **research exchange platform**, which shall incorporate the **Open Science process** within the domain of **energy research**. The platform shall allow the exchange of data, artifacts, documentation, and related information regarding the activities of ZLE. In addition, it should allow publication of early software versions to **increase transparency** in the software development process. Multiple theoretical and disciplinary perspectives and a **diverse range of research cultures** and experiences are to be incorporated into the research activities. Artifacts from existing open source platforms and results from open data repositories should be reused and linked in the developed ZLE platform. This platform shall serve as a mechanism for **transfer of knowledge and technologies** from applied research into practice.

## REFERENCES

1. BOAI: Budapest Open Access Initiative, [https://www.researchgate.net/publication/307696427\\_Budapest\\_Open\\_Access\\_Initiative\\_2002](https://www.researchgate.net/publication/307696427_Budapest_Open_Access_Initiative_2002)
2. Max-Planck-Gesellschaft: Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities, <https://openaccess.mpg.de/Berlin-Declaration>
3. European Commission: Guidelines to the Rules on Open Access to Scientific Publications and Open Access to Research Data in Horizon 2020 (2017)
4. BMBF: Open Access in Deutschland. Die Strategie des Bundesministeriums für Bildung und Forschung (2016)
5. MWK: Die Strategie Niedersachsens zur digitalen Transformation (2021)
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7. Munafò, M.R., Nosek, B.A., Bishop, D.V.M., Button, K.S., Chambers, C.D., Du Percie Sert, N., Simonsohn, U., Wagenmakers, E.-J., Ware, J.J., Ioannidis, J.P.A.: A manifesto for reproducible science. *Nat Hum Behav* 1 (2017)
8. Wilkinson, M.D., Dumontier, M., Aalbersberg, I.J.J., Appleton, G., Axton, M., Baak, A., Blomberg, N., Boiten, J.-W., Da Silva Santos, L.B., Bourne, P.E., et al.: The FAIR Guiding Principles for scientific data management and stewardship. *Scientific data* 3, 160018 (2016)
9. European Commission: Open Source Software Strategy 2020 – 2023. Think Open (2020)